U. S. DEPARTMENT OF AGRICULTURE.

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FLAX FOR SEED AND FIBER

IN

THE UNITED STATES.

BY

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LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
OFFICE OF FIBER INVESTIGATIONS,
Washington, D. C., February 18, 1895.

SIR: I have the honor to submit herewith the manuscript of Farmers' Bulletin No. 27, on the best methods of cultivating flax for seed and fiber in the United States, with statements regarding the special needs of the industry.

Respectfully,

CHAS. RICHARDS DODGE,
Special Agent for Fiber Investigations.

Hon. J. STERLING MORTON,
Secretary.

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FLAX FOR SEED AND FIBER.

INTRODUCTION.

In considering the cultivation of fibers in this country, the flax crop should undoubtedly be given first place. In 1890, when the present fiber investigations of the Department were begun, it was ascertained that flax was grown by our farmers almost wholly for seed, the straw, of inferior quality, going to the tow mills or the paper mills, when used at all, and selling for from $1 to $8 a ton, the average in the different sections being not more than $2.50 to $4. By far the larger quantity was wasted or burned, and represented no money value whatever. While in the older States the area under cultivation was found to be small and steadily decreasing, in the newer States, or States where agriculture is being pushed steadily westward from year to year, the area under cultivation seemed to be fairly holding its own, and was stated in round numbers at about 1,000,000 acres.

At present we produce very little if any flax that would compete with the fine flax imported for manufacture into the higher numbers of yarn, because our farmers do not now follow, nor have they in many years practiced, the careful methods of culture and after-treatment in harvesting and retting of the straw that are practiced in the prominent flax-growing countries of Europe. From the investigations and experiments of the Department with this culture, however, in the past few years, it has been demonstrated that a good quality of flax can be grown by farmers in many sections of the United States. With the increased skill and knowledge of culture that comes with practice, they will be enabled to grow a quality of flax that will compete with much of the flax purchased abroad for manufacture by the linen and flax twine mills of the United States.

The incentive to grow flax for fiber was never more urgent than at the present time. In several flax-growing countries the supply is steadily declining, and foreign buyers are already inquiring in this country regarding the possibility of making good a portion of this deficiency from the product of American farms.

Never before in the history of American agriculture, with wheat a drug in the market and the prices of other crops equally depressed, has there been such need of diversity.

PREPARATION OF THE SOIL.

In many instances too little attention is paid to the importance of deep plowing and reducing the seedbed to the proper tilth. Many foreign flax growers urge that the land should be fall plowed, though there are some who are of a different opinion, but it is recognized by all that the land should be brought almost to the condition of garden soil before the seed is sown. On small tracts of a few acres in Europe this is accomplished by spading over the land, although such laborious methods will never be practiced in this country, nor are they necessary with the improved implements available on every American farm.

For this country I would advocate deep fall plowing, with a cross plowing in the spring. Where heavy clay loams are chosen two plowings in the spring will give better results than one. The number of harrowings will depend wholly upon the lumpiness of the soil, as all clods must be broken up and the soil made fine and even. The roller should be used to make the ground as smooth and level as possible, and to press into the soil any small stones that may be upon the surface. Heavy lands that from their situation are liable to be more or less covered with surface water during the winter should be avoided. On account of the extra labor necessitated upon heavy land, it is better, therefore, to choose the medium soils that will yield readily to the action of the elements, and to the plow and harrow.

FERTILIZING.

Flax has been called an exhausting crop. Any crop is exhaustive to the soil that is grown year after year on the same land—where everything is taken away and nothing returned. This means that a crop of flax that will scutch out good fiber can not be produced on impoverished lands. In Belgium and other flax-growing countries, where land has been under cultivation for generations, no halfway measures are followed in this matter of keeping up the fertility of the soil. Here is an extract from my report upon Belgian culture bearing upon this point:

> Where stable manure is used it is generally put on before winter sets in. Then in spring before sowing time the ground is heavily treated with fertilizers, or night-soil in solution is poured over it. A great deal of the material is brought from the towns and kept in closed receptacles or reservoirs until the time for using it on the ground. Stable manures are used in connection with chemical fertilizers. Of the latter it is common to employ from 600 to 800 kilograms per hectare, or roughly, from 500 to 750 pounds per acre, and to go over the ground with the liquid night soil in addition.

On the new lands of the West good crops may be grown for a number of years without manures, though in time fertility must be exhausted and poor crops will inevitably follow. The flax crop, of all crops, makes heavy demands upon the soil, and for this reason it is frequently called an exhaustive crop. The stem of the flax plant is tall

and slender, growing rapidly, and the long roots, as they push down deeply, must have something to feed upon to make vigorous growth and good straw. It is on account of this habit of the plant to extend its roots to such depth in the earth that plowing and fine tilth are so essential; and the roots must find food or the plant will be of slow growth, woody, and deficient in fiber, and the product inferior both as to quality and quantity.

Regarding the use of stable manure, it should be stated that well-rotted (composted) manure is preferable to the coarse barnyard manures, which are liable to make rank growth at the expense of fiber. Another reason for using well-rotted manures is to avoid fouling the crop with weeds, as the coarse manures are liable to be filled with the seeds of weeds which germinate and grow with the flax. Dr. Ure formerly recommended a mixture of 30 pounds of potash, 28 of common salt, 34 of burnt gypsum, 54 of bone dust, and 56 of magnesia, which it was claimed would replace the constituents of an average acre of flax. Dr. Hodges, of Ireland, many years ago proposed the following, which he concluded by analysis would replace the inorganic matter removed from the soil by 2 tons of flax straw: Muriate of potash 30 pounds, common salt 25 pounds, burnt gypsum 34 pounds, bone dust 54 pounds, and sulphate of magnesia 50 pounds. This is very similar to the formula given by Dr. Ure above.

ROTATION OF CROPS.

Rotation of crops is little practiced in this country. It is worth knowing, however, what crops are best to precede a flax crop, though a systematic rotation is considered essential in all foreign flax-growing countries. A former New York grower used to begin the preparation of the soil for a crop of flax three years before planting it. The rotation followed was Indian corn, barley, oats, winter and spring wheat, and red clover, the corn being planted on land plowed from clover sod. The cleaning process, to rid the soil from weeds, began with the first crop which followed the clover sod. Rotation in Europe is reduced to such system that oftentimes the entire farm is laid off in plots and the order of planting for the different crops planned for several years in advance. The Belgian farmers are particularly careful in this matter. Regarding the precise order of rotation and even the length of time between two growths of flax on the same land in Belgium, there is the greatest difference of practice in the several districts, and even in different towns of the same district, so no one absolute course of cropping can be laid down. In the Courtrai region the occupancy of the land with flax varies from five to ten years, the average being about eight. In eastern Flanders it is five to nine, and in the Brabant five to eight.

In some other sections a much longer time elapses between two crops of flax, and several generations back fifteen and even eighteen years were sometimes allowed to intervene. One informant stated to me

that flax was most generally sown after leafy plants, such as potatoes or turnips, wheat and especially oat stubble being highly approved. A common rotation is clover, oats, rye, wheat, and in some cases hemp. Crops of rape, tobacco, beans, and vegetables (these latter crops on farms contiguous to towns), or even onions and salsify, are grown, as in middle Belgium. Clover is considered one of the best crops to precede a crop of flax, as its numerous roots go deep into the soil and from their decomposition not only furnish nutriment to the growing flax roots, but enable them more easily to push down into the soil.

SOWING THE SEED.

As to the proper time to sow in this country a former grower in New York State says: "Sow when the soil has settled and is warmed by the influence of the sun, and weeds and grass have begun to spring up, and the leaves of trees begin to unfold."

Mr. Avan Hemert, writing to the Department from Grand Meadow, Minn., says: "No definite rule can be laid down as to which time in the spring is the best to sow flax, atmospherical conditions governing the growth to a great extent. I consider for myself the first part of May is the best time for seeding it."

Too early sowing may result in injury to the growing plants. The work must be done with great regularity; in fact, in foreign countries many farmers employ for this purpose special workmen who make it their business at this season of the year. A practice followed by some farmers, especially where the soil is at all weedy, is to allow the land, after it is put in condition, to lie until the weeds appear; then, just before sowing, give the surface a light harrowing, when the greater part will be killed.

In regard to the manner of seeding the crop, it is usually put in by hand, broadcast, in foreign countries, there being experts at the business who go from farm to farm, as their services are required. In many of the experiments of the Department the seed was sown broadcast by hand, though in some instances broadcast seeders were employed, and a few drilled in their crop. I can not recommend the last-named method of seeding. As a rule, the best results are shown in the samples submitted where hand broadcast sowing had been practiced. The managers of mills who undertook experiments for the Department almost invariably report this practice. The work should be done with great regularity to secure an even growth of straw and the same standard of fineness for different portions of the field. The objection to drilling in the crop is that the outside straw will always be coarser than that straw in the center of the drill row, with a tendency to branch. The practice in Flanders is to sow in the morning and harrow the seed in with a close-set harrow. And after the seed has germinated the land is rolled.

QUANTITY OF SEED TO BE SOWN.

Having shown that it is possible to save the seed when flax is grown for fiber, I do not wish to be understood as saying that culture for seed production and culture for fiber production are one and the same thing. When flax is grown for seed without regard to fiber it is sown thin, at the rate of 2 to 3 pecks of seed per acre, in order that the plants shall branch and produce as large a crop as possible. A large seed is also desirable. When the production of fine fiber is the object, a thicker sowing is necessary, say from 1½ to 2 bushels per acre. This prevents branching, the plants are shaded, and a crop of clean, slender, straight straw is the result.

In the Department experiments of 1891, the rate was from 3 pecks to 2½ bushels. In the more easterly States and on the Pacific Coast 2 bushels were sown. At Yale, Mich. (Livingston & Co.), 70 to 112 pounds was the rate, or, practically, 5 pecks to 2 bushels. In examining the samples of straw from these experiments that were submitted to the Department a glance was sufficient to recognize that grown from 3 pecks of seed. The five samples from the Oregon Experiment Station were from sowings of 2 bushels of seed, and this quantity is recommended when a fine quality of fiber is desired.

Referring to the Belgian practice, where the finest fiber is produced, the amount of seed sown varies ordinarily from 2½ to 3 bushels per acre, though in one district (Hainault) it is claimed that the quantity sown is sometimes double this amount. Probably 3 bushels per acre comes nearer the general practice. Some growers hold that more should be used when the sowing is late than when early; at any rate, when planted too thickly, as is sometimes the case, it is afterwards thinned, though such a practice, of course, adds just so much to the cost of production.

KIND OF SEED TO SOW.

Much depends upon a careful selection of seed. Good fiber can not be grown from the average seed of the oil mills. Imported seed gives the best results, but if this can not be obtained, seed must be sown that has been produced from plants grown for their fiber, also from selected seed. A proper flaxseed should be pure, free from the seeds of weeds, and from all odors which would indicate mustiness and bad condition that would affect its germinating power. The foreign grower in purchasing his seed is subjected to a dozen forms of fraud, and the only safe plan pursued is to buy of reputable dealers exclusively.

In all cases the heaviest, brightest, and plumpest seed should be preferred. Get only the best. Mr. J. R. Proctor, of Kentucky, writing upon this subject many years ago, advocated the white blossom Dutch as the best seed for American flax growers. Mr. Eugene Bosse, a practical flax grower, states that his preference, based upon several years' experience, is for (1) "Riga seed, once sown in Belgium"—that

is to say, imported seed grown on Belgian soil from seed procured in Riga; (2) seed imported direct from Riga, but it must be Riga and not Finland seed; (3) Dutch (Rotterdam) seed, and (4) American seed, which he reports "as good as Nos. 2 and 3 when well cultivated, though it will not stand the drought as well." Mr. Bosse states that No. 1 will produce about 8 bushels of seed to the acre; No. 2, 10 bushels, and No. 3 between 8 and 10 bushels.

In Mr. Bosse's detailed account of his flax crop of 1889 he states that 1½ bushels of seed were sown to the acre. He obtained about 620 pounds of fiber and 10 bushels of seed to the acre, the flax selling for 11 cents a pound and the seed at $1 per bushel. He reckons the expense side of the account, including freight on the product, at $42, and his profits at $38.17 per acre.

METEOROLOGICAL CONSIDERATIONS.

In the discussion upon flax culture a great deal has been said about the hot, dry climate of the United States in comparison with the cool, moist climate of Ireland; but if the truth must be stated, the best flax is not grown in Ireland, nor is the best flax spun by the Belfast manufacturer produced by Irish farmers, but by the growers of Belgium.

The best American flax I have seen was grown at Green Bay, Wis., where the average temperature for the three growing months is 54° F., and with abundant rainfall. The average temperature of Belfast, Ireland, for the same period is 52.2° F., and for Brussels, Belgium, 55.9° F. The temperature for St. Paul, Minn., near which station superb flax was produced in the experiments of 1891, is only a fraction of one degree higher.

Studying the figures for humidity, we are enabled to make further interesting comparisons: For Brussels, Belgium, the average for the three growing months is 77.4 and the average annual 83. For Green Bay, Wis., average for three months 72 and for the year 77.9. For Cologne, Germany, the average for April, May, and June is but 67.1 and the annual but 74 (contrast with Green Bay), while for St. Paul, Minn., the averages are, respectively, 65.6 and 71. An effort was made to ascertain the humidity for Belfast, but persistent search through the records of the Weather Bureau, as well as all available publications running back forty years, was unsuccessful. On the authority of an expert linen weaver, formerly of Belfast, the average humidity for that station is stated to be 70 to 72.

For better comparison the following table is presented:

From records of the Weather Bureau.

	Temperature.		Humidity.	
	Average* 3 months.	Average annual.	Average 3 months.	Average annual.
Foreign stations:	*Degrees.*	*Degrees.*	*Per cent.*	*Per cent.*
Belfast, Ireland	52.2	48.8	.....	.....
Brussels, Belgium	55.9	.....	77.4	83.4
Prague, Bohemia	54.6	48.1	66	74
Cologne, Germany	55.7	50.6	67.1	74
American stations:				
Albany, N. Y.	57.7	.....	64.5	70.5
Green Bay, Wis	54.0	.....	72	77.9
St. Paul, Minn	56.7	.....	65.6	71
Portland, Oreg	56.9	.....	60.7	83

* April, May, and June.

By this table it is shown that the temperature of the leading flax-growing sections of this country and Europe is practically the same, the average for the four European stations being 54.3°, and for the four in the United States 56.3°, or a difference of but 2°. The humidity for the foreign stations given is slightly higher than for those of this country, though stations indicating greater humidity in the States named and near which fine flax can undoubtedly be produced could have been used. The humidity of Washington, as indicated by the data from Spokane, Olympia, etc., will be found almost as great as of any foreign stations reported, and we know that good flax can be grown in this new State from recent experiments by this Department.

From the fact that a fine crop of straw has been produced recently in "droughty Kansas," with an average of 28 bushels of seed per acre by irrigation, leads me to suggest that in localities liable to hot dry spells in the growing season irrigation may be practiced with good results. In the absence of experiment, however, I can make no authoritative statements in the matter.

WEEDS.

The growth of weeds will be one of the chief obstacles to successful flax culture in this country. It will be impossible to follow foreign methods of ridding the soil from weeds, as the work is done principally by women and boys, who go over the ground on their knees, picking out the weeds by hand. This work is done usually when the plants are from 1 to 2 inches high, though a second and sometimes a third weeding is found necessary. The American flax grower must avoid the labor of weeding by having clean land, made as nearly clean as possible by careful culture. A practice in vogue in this country by former flax farmers, where the land was much troubled with weeds, was to allow it, after being put in condition for sowing, to lie until the weeds appeared. Just before sowing a light harrow run over the ground destroyed the larger proportion. Where weeding became necessary it was performed when the plants were less than 5 inches high. Mr.

Todd's practice for the removal of the coarser noxious weeds, like thistles, dock, etc., was to send a man into the field shod with three or four pairs of woolen stockings, to avoid injury to the young flax by treading it into the soil. This was done when the plants were about 8 inches high. In the operation of weeding some attention should be paid to the condition of the soil, as it must be neither too wet nor too dry.

HARVESTING THE FIBER.

In Flanders and other portions of Belgium the seed is of secondary importance, and therefore to obtain as strong and fine fiber as possible the flax is pulled before it is fully ripe, or when it is just beginning to turn yellow, coarse flax ripening earlier than fine. The work is done (or begins usually) the last week in June, sometimes a little earlier, for, according to one of their old proverbs, "June makes the flax."

Mr. John Orr Wallace, writing of the practice in Ireland, says, "When the straw begins to turn yellow and the foliage within 6 inches of the ground is drooping, pull at once." To the suggestion that when the seed is saved the fiber is coarse, the same authority says:

> About the flax being coarse if the seed is saved, this will not be the case if the straw is pulled before being too ripe and hard. In France and Belgium our spinners get the finest fiber, and the growers there save the seed.

In the experiments of the Department not more than half of the flax was pulled at the right time, and a little of it was so overripe as to be almost worthless. At the Massachusetts Experiment Station the flax was pulled "when the lower leaves began to fall and the stalks next the ground had turned yellow, and the seed was in the dough." This flax was pulled at the right time.

As to the special mode of harvesting the crop, nearly every experimenter states that the straw was pulled. This is not the usual practice of the Western flax grower, who cultivates for seed, however, and it has been urged that it is absolutely essential, where the object is to produce both fiber and seed, or, to state it more precisely, when the object is to produce a common grade of fiber and at the same time save the seed. If the land surface is made very smooth, so that the knives of the reaper may be set low, cutting by machine (rather than pulling) may answer. Several inches of the best portion of the stem will be lost and the square ends of the fiber will not work into the "sliver" as smoothly as pulled flax when the fiber is being manipulated in the first stages of manufacture. A flax-pulling machine is a desideratum, and for the past two or three years inventors have attempted to work out the problem. The Department has knowledge of four inventions in this direction, one of which, the Lamar device, controlled by the Minnesota Flax Company of Minneapolis, has already shown good results.

After all has been said, pulling is essential to the production of fine fiber. If pulled by manual labor, the course is to draw the handful of straw out of the ground, and by striking the roots against the boot the

earth is dislodged. The straw is then laid in handfuls, crossing each other, so as to be readily made into bundles. In Belgium the flax is pulled with great care, the ends being kept very even, and the straw laid in handfuls upon the ground, a line of straw being first laid down, which serves to bind these handfuls when a sufficient quantity has been pulled to tie. When put into stooks to dry, the seed ends being tied together, the bottom ends are opened out, giving to the stook the appearance of an A tent. After drying in the stook the handfuls of straw are then tied into small bunches, or "beets," and piled something as cord wood is piled in this country, two poles being first laid upon the ground to prevent injury to the bottom layer by dampness, and two poles driven at each end of the pile to keep the "hedges" in form.

SAVING THE SEED.

The mechanical operation of removing the seed without injuring the fiber has been one of the problems of American flax culture. In the old days of flax cultivation in New York, whipping the seed capsules against a sharp rock, set at an angle of 45°, was the method resorted to. In foreign countries various methods are resorted to (as described in former reports), from hand thrashing to passing the bundles through powerful machines with iron cylinders so constructed that only the heads are crushed, the straw remaining in the hands of the operator during the entire operation. The common American practice has been to drive the straw through an ordinary thrashing machine, saving the seed but rendering the straw utterly worthless in its tangled and broken condition. Some attempts have been made to save the straw even with the ordinary thrasher by opening the concave. This is done so that the teeth will just come together; then with one man to open and pass in the bundles, another takes them by the butt ends and spreading them fan shape presents the seed end to the machine. The straw is not released, but is withdrawn as soon as the seed is torn off, when the bundles are again tied. The operation is not fully satisfactory, and the necessity of a rapid flax thrasher has stimulated invention, and several machines have been presented which will do the work more or less effectually, though an absolutely successful machine for this purpose is yet a desideratum.

As to the quantity of seed that may be secured per acre, the average yield in our experiments was 10 to 12 bushels per acre, though as high as 20 bushels have been reported. In Kansas two years ago an enormous crop of 28 bushels per acre was reported, the land having been irrigated to produce this result.

RETTING THE STRAW.

In this country the fiber is separated from the stalk by dew retting almost wholly. The best results are accomplished by the foreign method of water retting, which necessitates the building of "steep-

pools" especially for the purpose. A moist meadow is the proper place for dew retting, the fiber being spread over the ground in straight rows at the rate of a ton to an acre. If laid about the 1st of October, and the weather is good, a couple of weeks will suffice for the proper separation of the fiber and woody matter. When the retting is progressing unevenly, the rows are opened with a fork or turned with a long pole.

For water retting, the softest water gives the best results, and where access can not be had to lakes or sluggish or slow-running streams, "steep pools" will have to be built. A pool 30 feet long, 10 feet wide, and 4 feet deep will suffice for an acre of flax. Spring water should be avoided, or, if used, the pool should be filled some weeks before the flax is ready for it, in order to soften the water. It should be kept free from all mineral or vegetable impurities. The sheaves are packed loosely in the pool, sloping so as to rest lightly on their butt ends, if at all, for it is considered best to keep the sheaves entirely under water without allowing them to come in contact with the bottom. Irish growers cover with long wheat straw or sods, grass side down, the whole kept under water by means of stones or other weights. Fermentation is shown by the turbidity of the water and by bubbles of gas, and as this goes on more weights are required, for the flax swells and rises. If possible, the thick scum which now forms on the surface should be removed by allowing a slight stream of water to flow over the pool. The fiber sinks when decomposition has been carried to the proper point, though this is not always a sure indication that it is just right to take out. In Holland the plan is to take a number of stalks of average fineness, which are broken in two places a few inches apart. If the woody portion or core pulls out easily, leaving the fiber intact, it is ready to come out. The operation usually requires five to ten days. In Courtrai a second retting is sometimes given.

When the retting has been accomplished, the bundles should be taken out by hand—for the use of pitchforks may injure the fiber—and set up on end that the water may drain off gradually; twenty-four hours is a sufficient time. Then the bundles are opened and spread evenly over a newly mown grass field, to cleanse the fiber and improve its color, being turned occasionally by poles that it may color evenly. Three or four days will suffice for the grassing, and then, if thoroughly dry, the flax is ready to lift, tie in sheaves, and be put under cover, ready for scutching. As the farm operations end at this point it will not be necessary, in the limits of the present report, to go into details regarding the cleaning of the fiber.

PRACTICAL CONSIDERATIONS.

While I have given above full instructions for retting the crop, this operation is not strictly the work of the farmer, for in this country the industry must be developed on the lines of a practice that will be essentially American. In this age everything is reduced to specialties so far as possible, cost of production being reduced by cooperation.

This brings us to an important consideration which may be called one of the most urgent needs of the flax fiber industry in the United States. Something more is required to set the industry on its feet than for a body of farmers to undertake to grow the plant for fiber. There is a necessity for a class of skilled workers who will come between the farmer and manufacturer in carrying on the operations of retting and scutching. It is futile to expect the farmer to ret and scutch his flax. It is not done on the farm in foreign countries, nor in Canada, save, to a very limited extent, and it can not be done here. It is done largely in Russia, and low-grade fiber requiring most careful sorting by the buyers is the result.

As the case stands, the farmer is hardly in position to grow flax, save in an experimental way, until he is sure of a market, and the manufacturer, that is, the spinner, is not in a position to make offers of purchase or to name a price, because he is not sure that the farmer can grow flax of the proper standard, or that he can afford to purchase at any price, for his particular manufacture, such flax as the farmer may produce.

Does this mean a deadlock between grower and manufacturer, an insurmountable obstacle that will doom forever the American flax fiber industry? Not at all. It simply means that what isolated farmers can not accomplish alone must be accomplished by the establishment of little local industries. To borrow a foreign term, the future flax industry of the United States must be communal; that is to say, capital must establish scutch mills in localities where flax may be profitably grown, farmers of the neighborhood agreeing to produce 5, 10, or 20 acres of straw each, under the direction, if need be, of the managers of the mills, to insure the growth of a quality of straw that will give the proper standard of fiber. This relieves the farmers from any responsibility in the matter further than to produce a proper crop of straw. The scutch mills or tow mills attend to the retting and cleaning of the fiber, which in turn is sold to the spinner.

One good scutch mill will prepare the flax grown on a score or more of farms, and as the work is accomplished under one direction, the product will be far more even as to standards than would be possible were it prepared by 20 different men. The scutcher has a money interest in the matter of the production of properly grown straw by the farmer, and is in position to aid him by many hints and suggestions. In Canada and in northern Michigan (in the neighborhood of Yale, where there are successful scutch mills) the practice is to sell the seed to the farmers, at the mills, at a fixed price per bushel, the farmers agreeing to sow a certain number of acres to flax, the straw of which the managers of the scutch mills agree to take at a fixed price per ton, in some cases $10 being named. And in no other way can an American flax fiber industry be established.

This establishes three divisions of labor—as the growing of the crop by the farmer, the retting and scutching by the purchaser or factor, and the spinning and the weaving by the manufacturer.

THE "AMERICAN PRACTICE."

The farmers of the United States use improved implements and machines in all farm operations, and American farm implements are recognized as the finest in the world. What invention has done for other rural industries is possible for the flax industry, and by the use of improved machines in every stage of flax culture, the difference in wages between this country and the Old World will be more than equalized. The "American practice," then, means simply an intelligent practice, for the growth of both fiber and seed, achieving economical production by the employment of labor-saving machinery, even in the pulling of the flax straw.

Fine flax can be grown in the United States, providing the farmers grew it intelligently and perseveringly—not one year, or two, or three, but year after year, growing each year a little, and growing it well.

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